CLAIMS

1. A frequency multiband antenna comprising:

- a PBG material (142; 172) (Photonic Bandgap) suitable for the spatial and frequency-wise filtering of electromagnetic waves, this PBG material exhibiting at least one stopband and forming an exterior surface (38; 158) radiating in emission and/or in reception,
- at least one defect (156; 180) of periodicity of the PBG material in such a way as to create at least one narrow passband within said at least one stopband of this PBG material, and
- an excitation device (160, 162; 190) suitable for emitting and/or receiving electromagnetic waves inside said at least one narrow passband created by said at least one defect,

characterized in that:

- the excitation device is suitable for working simultaneously at least around a first and a second distinct working frequency;
- the first and the second working frequencies are situated inside respectively a first and a second narrow passband, mutually distinct, and
- the first and the second narrow passbands are created by the same defect (156, 180) of periodicity of the PBG material (142, 172).

2. The antenna as claimed in claim 1, characterized in that the periodicity defect of the PBG material (142, 172) creating the first and the second narrow passbands forms a leaky resonant cavity exhibiting a constant height in a direction orthogonal to said exterior radiating surface (158), and in that this height is adapted so as to place the first and the second narrow passbands within said at least one stopband of the PBG material.

3. The antenna as claimed in claim 2, characterized in that the height of the cavity is adapted so as to place the first and the second narrow passbands within one and the same stopband of the PBG material (156).

4. The antenna as claimed in claim 2, characterized in that the PBG material (172) exhibits a first and a second mutually spaced disjoint stopband, and in that the height of the cavity is adapted so as to place the first and the second narrow passbands within respectively the first and the second stopbands of the PBG material (172).

5. The antenna as claimed in any one of claims 1 to 4, characterized in that said first narrow passband is substantially centered on a fundamental frequency, while said second narrow passband is substantially centered on an integer multiple of this fundamental frequency.

6. The antenna as claimed in any one of claims 1 to 5, characterized in that the cavity exhibits a family of resonant frequencies formed by a fundamental frequency and its harmonics, the resonant mode of the cavity and the radiation pattern of the antenna being the same for each resonant frequency of the family, and in that the first and the second working frequencies each correspond, in their respective narrow passband, to a frequency of the same family.

7. The antenna as claimed in any one of claims 1 to 6, characterized in that the cavity exhibits at least two families of resonant frequencies each formed by a fundamental frequency and its harmonics, the resonant mode and the radiation pattern of the antenna being the same for each resonant frequency of one and the same family and different from those of the other families of resonant frequencies, and in that the first and the second working frequencies each correspond, in their

respective narrow passband, to frequencies belonging to different families.

8. The antenna as claimed in any one of claims 1 to 7, characterized in that the excitation device (190) is able to emit electromagnetic waves at the first working frequency having a different polarization from the electromagnetic waves emitted at the second working frequency.

9. The antenna as claimed in any one of claims 1 to 8, characterized in that the excitation device comprises at least one same excitation element (190) suitable for emitting and/or for receiving electromagnetic waves simultaneously at the first and at the second working frequencies.

10. The antenna as claimed in any one of claims 1 to 8, characterized in that the excitation device comprises a first and a second excitation element (160, 162) each suitable for emitting and/or for receiving electromagnetic waves, and in that the first excitation element (160) is suitable for working at the first working frequency, while the second excitation element (162) is suitable for working at the second working frequency.

11. The antenna as claimed in claim 10, characterized in that each of the excitation elements is able to generate, on said exterior surface, respectively a first and a second mutually disjoint radiating spot, each of these radiating spots representing the origin of an electromagnetic wave beam radiated in emission and/or in reception by the antenna.

12. The antenna as claimed in any one of claims 1 to 11, characterized in that the leaky resonant cavity is of parallelepipedal shape.